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STUDIES ON THE DIVERSITY OF SNAKE REPELLENT PLANTS WITHIN SOME COMMUNITIES IN DELTA STATE, NIGERIA

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ABSTRACT: Snakes have been a major pest posing potential threat to human life from time immemorial. Plant-based repellents have been used for generations as protective measures against snakes within homestead and other environment. This study was carried out on the diversity of plants used to repel snakes within five communities in Delta State which included Abraka, Agbor, Asaba, Sapele and Ughelli. Trips were made to the communities for observation and documentation of plants that are used within homestead as snake repellent. Information on local names, common names, family, parts of plant used, method of preparation and utilization were recorded. Photographs of the plants were taken with a digital camera while plant identification was done using appropriate taxonomical procedures. A total of 11 plant species; *Allium sativum*, *Andrographis paniculata*, *Capsicum annum*, *Cymbopogon citratus*, *Datura stramonium*, *Garcina kola*, *Nicotiana tabacum*, *Ocimum gratissimum*, *Sanseviera trifasciata, Turnera ulmifolia* and *Vetiveria. zizanioides* belonging to 8 families; Acanthaceae, Amaryllidaceae, Asparagaceae, Clusiaceae, Lamiaceae, Passifloraceae, Poaceae and Solanaceae were recorded in this study. Majority of plant life form existed as herbs except for bitter kola (*G. kola*) which is tree. Solanaceae had the highest number of plants (27.2%), followed by Poaceace (18.2%) while other families had 9.1% respectively. The study showed the abundance of plant species with snake repellent in the study areas. Therefore, growing these plants around homestead will promote a safe and healthy environment in these communities. However, there is need to establish the efficacy and chemical constituents of the plants as well as their bioconservation.
Key words: Diversity, snake repellent, plant species, communities, Delta State

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INTRODUCTION

Snakes are deadly crawling creatures commonly found everywhere in the ecosystem. They are mostly attracted by other little animals in our environment such as geckos, lizards, mice and rats which form their food. During this process, the snakes crawl into homes, gardens and hidden areas hence posing potential threats to human life. Snake bites are a common problem in many parts of the world; their venoms being deadly and can kill within a short period of bite. In the biblical story, many Israelites were bitten by poisonous snakes and died (Numbers 21:6).

Snake bite incidences are common in some rural areas causing morbidity and mortality among farmers, hunters and children [1]. In Asia, snakebite induced death range from 15,400 – 57,600 per year while the range of 3,500 – 32,100 deaths per year were recorded in Sub-Saharan Africa, most of which are reported in the rural poor farmers [2]. Literature review indicated that about 35,000-50,000 deaths due to snake bites have been reported in India per year [3]. Most often, snake bites mostly occur in evenings and at night when they are accidentally stepped on as they move through leaf litters and scrap materials in the environment.

Open-style habitation and practice of sleeping on the floor also expose people to bites from nocturnal snake species. WHO [4] recognized snakebite as a neglected tropical disease and in the tropics; it is an occupational disease for agricultural workers which could affect food production.

Prevention, control, and management of snake infestation have continued to rely heavily on the application of synthetic chemical. However, this has proved to be costly and non-ecofriendly to the environment [5]. Various plants with snake repellent potentials have been in use in traditional practice in the past as protective measure and are still in use in rural communities in the tropics. In most developing countries, where the use of technological methods is still lacking, the most accessible alternative is the use of traditional/cultural methods [6]. The use of botanicals for pest control is as old as agriculture itself. However, the use of plants such as tobacco (*Nicotiana tabacum* L.) leaves for fumigation in stores during the late 1500s, the use of *Sabadilla officinale* A. Grey ex Benth. and application of *Quassia* spp extracts during the early 1600s among others [7].

Studies on snake repellents in India by Renapurkar *et al*. [8] revealed that hexane extracts of *Allium sativum*, *Acorus calamus*, *Azardirachta indica*, *Nicotina tobacum* and *Vitex negundo* as well as oil extracts of *Acorus calamus* among others were found to be very effective snakes repellents. The use of monotherapy preparations made from a single plant species including *Annona stenophylla* and *Securidaca longipedunculata* as snake repellent has also been reported [9]. These plants are either applied as extracts or are sprinkled around homestead as snake repellent. Similarly, the use of plants snake repellent and their components as potential irritants to snakes have earlier been documented [10].

The repellent potentials of *Schumanniophyton magnificum* widely used in African ethnomedicine have been reported [11]. The juice is used as snake bite remedies in Nigeria and the protective effects of the extracts against snake's venom have been demonstrated. Cinnamic acid and capsaicin are potent mammalian irritants but they do not have much an effect for the brown treesnake or birds [10]. This study was carried out to provide information on plants species with snake repellant potential for the management of snake infestation in some communities in Delta State, Nigeria.

MATERIALS AND METHODS

Study Area

This study was conducted in five localities viz; Abraka, Agbor, Asaba, Sapele and Ughelli in Delta State, Nigeria (Figure 1). The state lies approximately between Latitude $5^0$00 and $6^0$45' East and Latitude $5^0$00 and $6^0$30' North. Asaba is located within longitude 06^037^1E and 06^045^1E and latitude 06^005^1N and 06^017^1N [12]. It is the capital of Delta state and is located within the northern flank of the Niger Delta Basin. Agbor, a town in Delta State of Nigeria lies within latitude 6^010^iN and 6^020^iN, and longitude 6^010^iE and 6^015^iE. Abraka area, situated between latitude 5^0 45^i and 5^0 50^i N and longitude 6^0 and 6^0 15^i E is located in Ethiope East Local Government area. Ughelli lays between latitude 5^0 19^1 and 5^0 25^1N and longitude 6^0 10^1 and 6^0 14^1 E. It is a commercial town located on the right bank of River Forcados. Amukpe is located on longitude 05^044^1E and latitude 05^051^1N on the south bank of River Ethiope.

Method of Data Collection

Trips were made to the selected communities in Delta State to collect plants that are used within homestead to repel snakes. A structured information note was prepared comprising of plant names, local names, common names, family, parts of plant used, method of preparation, application and other uses. This was use to obtain information from indigenes comprising of elderly men and women who are more familiar with the ethnobotanical uses of plants as well as herbalists who are inclined in the aspect of plant and their properties. Photographs of the plants were taken with a digital camera for identification.

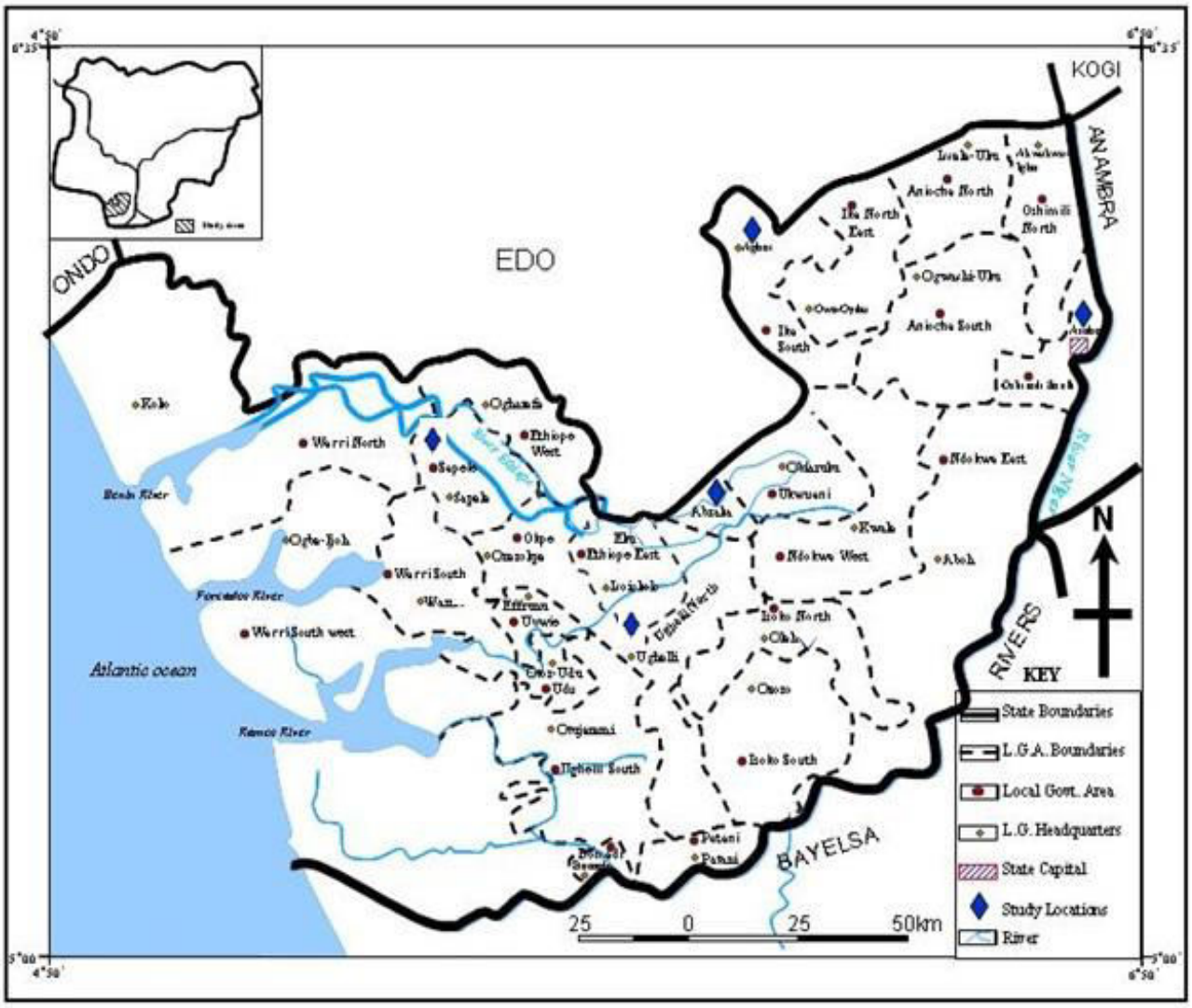

Figure 1. Map of Delta State showing the study locations

Identification of Plant Specimen

Identification of the plant species for their scientific classification was done using Hutchinson and Dalziel [13]. Further identifications were carried out using Iwu [14] and Odugbemi [15]. All the plant species were correctly identified and authenticated at the Department of Botany herbarium, Delta State University, Abraka.

RESULTS

A total of 11 plant species belonging to 8 different families were encountered during the study with snake repellent potentials. The scientific name, common names, families, life form and part used are presented in Table 1. The plants included Acanthaceae, Amaryllidaceae, Asparagaceae, Clusiaceae, Lamiaceae, Passifloraceae, Poeceae and Solanaceae. Similarly, the photographs of the identified plant species in this study are shown in Plates 1 – 11.

In the study, majority of plant life form seen exist as herbs except for bitter kola (*G. kola*) which is a tree. The plants encountered were mostly utilized by planting (Table 2.). Figure 2 shows the percentage occurrence of the different plant families used as snake repellent. From the result, Solanaceae had the highest percentage occurrence (30.0%), Poaceace (20.0%) and other families which had 10.0% abundance respectively.

Table 1. Plants used as snake repellents in the study areas

S/N	Scientific Names	Family	Common names	Life Forms	Parts Used
1	*Allium sativum* L.	Amaryllidaceae	Garlic	Herb	Bulb
2	*Andrographis paniculata* (Burm. F) Wall.	Acanthaceae	King of bitters	Herb	Whole plant
3	*Capsicum annum* L.	Solanaceae	Chili pepper	Herb	Seeds
4	*Cymbopogon citratus* (L.) Spreng	Poaceae	Lemon Grass	Herb	Whole plant
5	*Datura stramonium* L.	Solanaceae	Thorn Apple	Herb	Whole plant
6	*Garcinia kola* Heckel	Clusiaceae	Bitter kola	Tree	Seeds
	Nicotiana tabacum L.	Solanaceae	Tobacco	Herb	Whole plant
8	*Ocimum gratissimum* L.	Lamiaceae	Scent Leaf	Herb	Whole plant
9	*Sansevieria trifasciata* Prain	Asparagaceae	Mother-in-Law Tongue	Herb	Whole plant
10	*Turnera ulmifolia*	Passifloraceae	Yellow alder	Herb	Whole plant
11	*Vetiveria zizanioides* (L.) Roberty	Poaceae	Vetiver	Herb	Whole plant

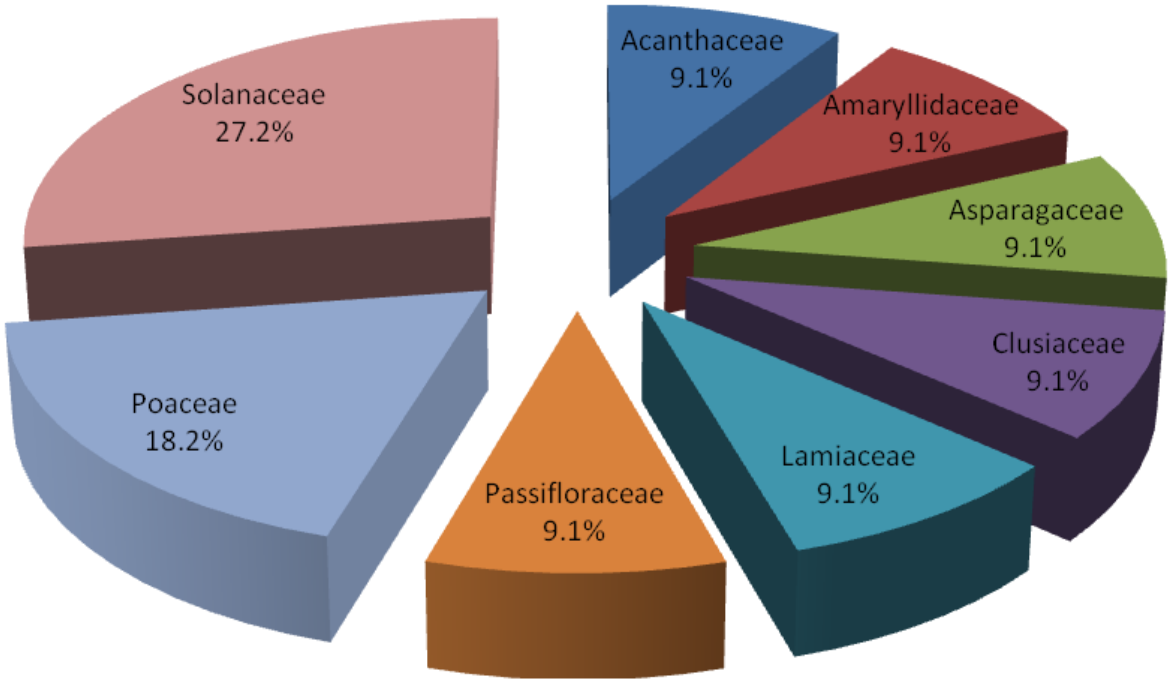

Figure 2. Percentage distribution of plant families

Table 2. Scientific names and mode of administration of plants used as snake repellents in the study areas

S/N	Scientific Names	Mode of Utilization
1	*Allium sativum* L.	Spreading the bulbs of garlic in different corner of a house, around a building, in a homestead, the smell of which repel snake away from that surrounding. Spraying garlic mixture (the mixtures of garlic bulb and pepper) around a place are very effective as snake repellent. Peeled garlic cloves are placed strategically on window seal and near doors in a house to repel snakes
2	*Andrographis paniculata* (Burm. F) Wall.	Planting of *Andrographis paniculata* around houses, compounds, building, fields, homestead, schools repel snakes away from such places.
3	*Capsicum annum* L.	Spreading: the seeds are collected and spread or placed in a different corner of a building, a house or homestead to repel snake. Grinding and sprinkling –some seeds of chili pepper and some bulb of garlic are grinded into powder. This mixture is sprinkled around a building, a house and homestead, the harsh smell and the hot nature keep snake at bay from that surroundings.
4	*Cymbopogon citratus* (L.) Spreng	Planting –planting of lemon grass around building, house, school, church, yard and in our environment in general. The smell of this plant acts as snake repellent
5	*Datura stramonium* L.	Planting - planting *Datura stromonium* around yards, homestead repels snakes away. The odour from this plant repels snakes away.
6	*Garcinia kola* Heckel	Spreading –The seeds are collected and spread at different places around a building, a house and in a homestead to repel snakes. Cutting and spreading – The seeds of bitter kola can also be cut into different pieces after the outer part has been removed. The pieces are then spread around a house, a building and in a homestead. Snakes will migrate at least 300meter from it. Sprinkling –The seeds of bitter kola can be cut into pieces after the outer part has been removed, grounded into a smooth powdered form and sprinkle around some the house to repel snakes.
7	*Nicotiana tabacum* L.	Planting-planting of *Nicotiana tobaccum* around corner of houses, yard helps to repel snakes away.
8	*Ocimum gratissimum* L.	Planting - Cultivating the plant around homestead, houses, yards repel snakes away, the scent from this plant sometimes repel snakes
9	*Sansevieria trifasciata* Prain	Planting – planting of this plant around homestead and yards helps to repel snakes. Because of its shape and sharp margins of the leaves of *Sansevieria trifasciata,* it acts snake repellent. Placing in a vast – *Sansevieria trifasciata* is an ornamental plant cultivated around houses, in a vast and placing the vast within the house and living rooms helps to repel snake. Snakes do not like the appearance of this plant.
10	*Turnera ulmifolia*	Planting – planting of this plant around homestead and yards helps to repel snakes. Because of its appearance and odour, *Turnera ulmifolia* L. acts as snake repellent.
11	*Vetiveria zizanioides* (L.) Roberty	Planting – planting of this plant around homestead and yards helps to repel snakes. Due to the shape and sharp margins of the leaves of *Vetiveria zizanioides* (L.) Roberty, it acts as snake repellent.

Plate 1. Garlic (*Allium sativum* L.) **Plate 2. King of bitter (*Andrographis paniculata* Burn. F)**

Plate 3. Fruits of chili pepper (*Capsicum annuum* L.) **Plate 4. Lemon grass (*Cymbopogon citrates* L. Spreng**

Plate 5. Thornapple (*Datura stromonium*) **Plate 6. Seed of Bitter Kola (*Garcinia kola* Heckel)**

Plate 7. Tobacco (*Nicotiana tabacum* L.) planted around a house Plate 8. Scent leaf (*Ocimum gratisimum*)

Plate 9. Mother inlaw tongue (*Sansevieria trifasciata* Prain)

Plate 10. Yellow alder (*Turnera ulmifolia* L.) **Plate 11. Vetiver (*Vitiveria zizanioides* (L) Roberty)**

DISCUSSION

Some of the plants encountered in this study have been reported by different authors. The presence of *Nicotiana tabacum* L. in this study is similar to the report of Thacker [16] who reported the use of tobacco (*Nicotiana tabacum* L.) leaves for fumigation in stores as early as the late 1500s. Plants of the family Clusiaceae such as the *Garcinia kola* Heckel (bitter kola) was observed to posses snake repellent potentials in the present study. This species have been reported to posse's snake repellent potentials by Borokini *et al.* [17] by spreading the seeds around homes. Similarly, the family Lamiaceae with the species *Ocimum gratissimum* was also reported to drives snakes away as its scent act as repellent.

The use of *Andrographis paniculata* in the family Acanthaceae reported in this study has also been reported by Shalini and Narayana [18] as snake repellent plant. They opined that the potentials of this plant as snake repellent could be attributed to bitter lactone andrographolide and kalmegh present in the leaves. The use of whole plant and leaves of *Sensevieria trifasciata* in the family Asparagaceae as snake repellent in villages in Bangledash has been documented by Rahmatullah *et al.* [19]. Other species of the family Asparagaceae with properties that repel snakes have earlier been documented [20].

The use of *Garcinia kola* as snake repellent could be attributed to its astringent nature. This tropical plant is a wonderful gift of nature which has the ability repel snakes within a distance of about 300 meters radius and when in contact can demobilize or out rightly kill a snake [21]. The seed of bitter kola is used to naturalize all kinds of poisons and when grounded into powder and sprayed in environment all snakes will avoid the area. Ofor *et al*. [22] reported the use of *Garcinia Kola* seeds as essential in the control of snakes and other reptiles, similar to the present study. Other studies on snake repellent include those of Renapurkar *et al*. [8] who reported that extracts of species such as garlic *(Allium sativum)*, tobacco *(Nicotina tobacum)* among others were found to repel snakes effectively. Nair, [23] reported that the seeds serve as a bitter stimulant as well as snake repellent when they are placed round the compound.

Lemon grass (*Cymbopogon citrates*) is thickly planted around houses and rice paddies in different parts of the world, where it acts as both an insect and snake repellent [24]. It has been reported that snakes are repelled by the smell and snakes avoid slithering through the dense, sharp-edged leaves because of potential cuts. *Ocimum* spp. recorded in this study has previously been reported to be important sources of repellents and toxicants against many pests include snakes and insects. Two active materials namely camphor and eugenol elicit repellent effects. Since *O. gratissimum* is rich in camphor, this could be the factor responsible for repelling effects.

CONCLUSION

The result from this study has shown that several plant species are abundant and useful in Delta State for the control of snakes in the environment. Therefore growing these plants around homestead will promote a safe and healthy environment in these communities. The knowledge on traditional repellent plants obtained through ethnobotanical studies is a valuable resource for the development of new natural products. However, there is need to establish the efficacy and chemical constituents present in these plants. Furthermore, bioconservation of such species with repellent potentials is necessary.

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